REMARKS

This response is being presented in response to the Examiner's action of January 15, 2003. The Examiner has indicated that claims 1 and 3-6 continue to be rejected. In light of the following detailed arguments, it is respectfully submitted that the claims fully distinguish over the applied prior art.

The Examiner rejected claims 1 and 3-6 under 35 USC §103 as being unpatentable over US Patent No. 6,237,369 to LeBlanc et al. in view of US Patent No. 3,885,945 to Rees taken alone or in combination with US Patent No. 5,632,795 to Brown et al. or US Patent No. 5,655,464 to Moreau et al. The Examiner also rejected claims 1-6 under 35 USC §103 as being unpatentable over LeBlanc et al. in view of Rees taken alone or in combination with either Moreau et al. or Brown et al. and further in view of US Patent No. 5,975,886 to Philippe et al.

The Examiner stated that LeBlanc discloses the process of melting glass batches with a burner fired with fuel and oxygen. The flame can be adjusted to be luminous and infringes on the surface of the glass and appears to diffuse. The Examiner notes that no step for producing flat glass is recited in the claim and thus the claim does not distinguish from LeBlanc on this basis. The Examiner does state, however, that both Brown and Moreau do show the production of flat glass, and further states that one skilled in the art would have combined the flat glass of either of these references with Brown to show this limitation. The Examiner states that Philippe shows an improved burner having separate oxygen and fuel outlets that produce a wide and luminous flame. The Examiner states that the burner could be used in glass furnaces and says that it would thus have been obvious to use this in the manner shown by LeBlanc to gain the

benefits of the improved burner.

In view of the applicants' prior response, the Examiner has added the Rees reference and asserted that applicants have misinterpreted the teachings of LeBlanc et al. The Examiner states that the Rees reference teaches that temperatures such as 2000°F are suitable to maintain the walls of the bubbles or foam sufficiently fluid to break down and release the gas. The Examiner further states that Rees explains that this lower temperature offers advantages over prior art techniques of suppressing bubbles using temperatures higher than the glass forming temperature.

Before discussing the prior art in detail, applicants wish to discuss the present invention as defined in the independent claims. Independent claim 1, as amended, defines a method of producing flat glass. In claim 1, glass batch is melted in a furnace using burners fired by fuel and oxygen resulting in the formation of foam on the surface of the molten glass. A burner, provided in a side-wall of the furnace, downstream of such burners producing foam produces a flame which is diffuse, luminescent and impinges on the surface of the glass dispersing said foam. The flame is cooler than the surface of the glass it contacts.

Similarly, amended independent claim 6 defines an improved method of producing flat glass. The glass is melted in a furnace and subsequently formed into a continuous ribbon. The glass is melted using burners fueled by fuel and oxygen resulting in formation of foam on the surface of the molten glass. The foam is dispersed by directing a diffuse, luminescent flame originating from a burner provided in a side-wall of the furnace onto the surface of the glass carrying the foam. The flame is cooler than the surface of the glass it contacts.

It is respectfully submitted that the amendments made to independent claims 1 and 6 are fully supported by the original disclosure, for example on page 4, lines 28-31 of the original disclosure. It is therefore submitted that the amendments made herein do not constitute new matter.

Applicants continue to agree with the Examiner's assertion that LeBlanc does teach a process of melting glass using a burner fueled with fuel and oxygen. The resultant flame is luminous and impinges on the surface of the molten glass.

It is respectfully pointed out that the oxy-fuel burners used to melt the glass forming materials in the LeBlanc reference are located in the roof of the furnace (see, e.g., col. 1, lines 8-14; Figures 1-4). LeBlanc indicates that in this position, the glass forming materials can be melted "without the use of regenerators or recuperators to improve the rate of melting and the quality of the glass products." (col. 1, lines 15-17). Thus, the burners of LeBlanc fire perpendicular to the surface of the glass. This configuration is compared to the oxy-fuel configuration conventionally employed in glass melting furnaces in which the burners are designed to fire parallel to the surface of the glass. The LeBlanc reference notes that undesirable side effects of side-wall burners (related to heat transfer into the furnace crown and surrounding refractory bricks) can be avoided by the use of this roof-burner configuration. Thus, LeBlanc specifically notes the benefit of the use of the roof-burner arrangement.

To the contrary, both amended independent claims 1 and 6 utilize a burner in the side-wall of the furnace. LeBlanc does not teach this and in fact *specifically teaches away from the use of burners in the side-wall.* Thus, not only is it not taught in LeBlanc, it would not be

obvious from the LeBlanc reference to install the burners in a side-wall arrangement as is done in the present invention, as claimed. It is respectfully admitted that it would not be possible to modify the LeBlanc reference to place the burner in the side-wall, as LeBlanc specifically teaches that this is undesirable. Thus, attempting to so modify the LeBlanc reference would be contrary to the teachings of the LeBlanc reference and would thus be improper. On this basis it is respectfully submitted that LeBlanc is not the proper basis for a §103 reference against the present independent claims.

Further, it is respectfully submitted that the flame originating from an oxy-fuel roof burner is not described in the LeBlanc reference. Therefore, this burner arrangement is neither taught nor even defined, it is respectfully submitted that it cannot be described as being "diffuse" or "ill-defined" as is required by claim 1. To the contrary, the flame described in LeBlanc shows characteristics significantly differing from those claimed in claim 1. In LeBlanc, the roof burner arrangement provides that the oxygen and fuel streams flow from a burner block in such a manner that shear stresses result in partial immediate combustion (col. 7, lines 57-63) followed by full combustion proximate the surface of the raw glass forming material (col. 8, lines 62-66). The opening of the burner block focuses the burner flame and acts to prevent it from spreading outwardly. The flame caused y this sequence will be "clean" and "well-defined." This type of flame leads to accumulation of a sharp pressure gradient between the flame and the surface of the molten glass. The greater pressure of the flame (compared to the molten glass) provides force necessary to accelerate the deflected flame outwardly and radially along the impinged surface (col. 8, lines 16-21). This action is depicted in Figures 3, 4 and 5 of the LeBlanc patent. Thus,

the flame in LeBlanc is qualitatively different from the diffuse flame of the present invention, in contrast to the Examiner's characterization of this flame. It is submitted that on this basis the present independent claims further distinguish over the applied references.

Applicants also respectfully disagree with the Examiner's characterization of the text in col. 9, line 43 to col. 10, line 4. The Examiner opines that this text supports the oxy-fuel burner "may be located downstream in a conventional side fired oxygen-fuel furnace." However, it is noted that up to col. 9, line 65, this refers to the at least one downstream oxy-fuel burner introduced in the preceding paragraph. From line 66 of column 9 to column 10, line 4, the description of the at least one oxy-fuel burner now refers to the downstream burner alone, but instead to all burners, whatever their position in the furnace (note that the prefix downstream is omitted from the label of the burner in the latter text). The text continues by comparing the benefits of a roof burner to a conventional side burner arrangement. On this basis it is again respectfully submitted that the LeBlanc reference does not teach the interchangeability of a roof burner arrangement with a side fired furnace. It is submitted that this further differentiates the claims of the present invention over the LeBlanc reference.

With regard to the Rees reference, which the Examiner has newly applied to the pending claims, it is respectfully submitted that one skilled in the art would not have recognized, from LeBlanc in view of Rees, that the use of a flame cooler than the surface of the glass contacted reduces foam. LeBlanc deals with the issues surrounding enhanced heating of the glass, including heating from a downstream burner which is of similar construction and design as the upstream burners cited earlier in the patent. LeBlanc teaches, in a passage cited in the Office

Action (lines 58-65 of column 9) that by reducing foam on the downstream surface by the use of a roof burner, heat transfer is *increased* into the body of glass material. Transfer of heat from the flame of the roof burner into the body of glass of necessity indicates that the flame is hotter than the material to be heated. It is a basic principle of thermodynamics that heat will flow from the warmer material to the cooler material. LeBlanc teaches that this flow of heat is desirable in that It reduces the thermal energy otherwise required in the glass furnace, improving the operating efficiency.

Rees, in column 2, line 64 to column 3, line 2 indicates that the reason for supplying a downstream supplemental heat source is **to apply sufficient heat to the upper surface** to maintain the surface in a state sufficiently fluid to release gases from the molten gas evolved during melting and refining. The glass is heat to 2000°F to reduce the viscosity of the gas thereby collapsing bubbles and facilitating the release of trapped gas. From the above, it should be understood that Rees does not teach the use of a flame cooler than the surface of the contacted glass (again, the object of Rees being to heat the glass surface). Thus, one skilled in the art would not find any suggestion from Rees to use such a cooler flame. As this feature is lacking in both Rees and LeBlanc, it is submitted that no reasonable combination of these references would yield this feature of the present invention.

It is believed that the above discussion shows first that it is not proper to combine the LeBlanc and Rees references. Further, even if these references could be properly combined, it is asserted that no reasonable combination of LeBlanc and Rees yields the present invention, as claimed in claims 1 and 6.

The additional references were cited by the Examiner to show the use of this type of burners in the production of flat glass and the need for reduced NO_x emissions. Philippe was cited by the Examiner to show an improved burner with separate oxygen and fuel outlets producing a wide and luminous flame. As argued previously, it is submitted that Philippe is not properly combinable with the LeBlanc reference. Even if Philippe were properly combinable with the LeBlanc reference, it is respectfully submitted that neither the Moreau nor Brown nor Philippe reference adds anything to overcome the deficiencies in the LeBlanc and Rees references identified above. Therefore, the addition of these references to the LeBlanc and Rees references also fails to render the present claims unpatentable.

Based upon the above, it is respectfully asserted that no reasonable combination of LeBlanc, alone or in conjunction with any of the applied secondary references, teaches the present invention as claimed in claims 1 and 6.

The dependent claims 3-5, are believed to be allowable based, at least, upon their dependence, directly or indirectly, on an allowable base claim 1 as discussed above.

In view of the above remarks, a favorable reconsideration of the present application and the passing of this application to issue with all claims allowed are courteously solicited. If the Examiner wishes to modify any of the language of the claims in an effort to move the application towards allowance, a telephone call to the undersigned would be greatly appreciated.

Respectfully submitted,

Mark A. Hixon
Registration No. 44,766

ATTORNEYS
Marshall & Melhorn, LLC
Four SeaGate - 8th Floor
Toledo, Ohio 43604
(419) 249-7114
(419) 249-7151 (Facsimile)